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ABSTRACT

The Student/Teacher Achievement Ratio (STAR) Project first investigated the effect of small class size on student achievement with over 6,000 Tennessee primary students in 1985 through 1989. The study found a consistent and significant benefit of small classes for all students, with the greatest advantages for minority, inner-city students from low SES backgrounds. For grades 4 through 8, the Tennessee Department of Education provided researchers with standardized achievement test scores, which were then matched to the appropriate STAR cohorts and compared for significant differences. Results through grade 8 showed that those students who were in small classes during K-3 continued to score significantly higher on standardized achievement tests than their peers who had attended regular classes or regular classes with a teacher aide. However, at grade 9 statistically significant results did not emerge, which was attributed to the statewide testing procedures that were in place for the ninth-graders. The follow-up study reported here was conducted to provide continuity to STAR by determining whether or not at the end of grade 10 STAR (K-3) small-class students maintained any academic achievement advantages over their peers. Data were drawn from the Tennessee Competency Exam (TCE), required for high school graduation; results indicated that tenth-graders who had participated in STAR small classes appeared to have maintained advantages over their peers. Although there were no statistically significant differences in the TCE grade 10 test scores by class type, it was found that a significantly larger portion of small-class students, compared to students from regular classes or regular classes with teacher aides, had already passed the TCE requirement at grade 8. (Contains 14 references.) (EV)

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ED 419 593

The Student/Teacher Achievement Ratio (STAR) Project

STAR Follow-up Studies
1996-1997

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Background

Many legislators and school administrators had long doubted the significance of lower student-teacher ratios because there was a lack of conclusive scientific evidence. Dr. Helen Pate-Bain conducted a small-scale study of class-size within one Nashville Davidson County elementary school. In 1985, Pate-Bain presented Tennessee Legislators with the positive results from her study and thereby successfully lobbied for $12 million dollars to conduct the Student/Teacher Achievement Ratio (STAR) Project (Tennessee House Bill 544).

STAR (1985-1989) compared the academic achievement of over 6,000 Tennessee primary-school children (K-3) who were randomly assigned to small classes (13-17 students), regular-size classes (22-25 students), or regular-size classes with full-time teacher aides. Results (K-3) consistently and significantly favored small classes ($p \leq .01$). Finn and Achilles (1990) reported "This research leaves no doubt that small classes have an advantage over larger classes in reading and math in the early primary grades" (p. 576). The significant findings reached across grade levels, school locations, and student ethnicity, gender, and socioeconomic (SES) status. All students significantly benefited from participation in small classes, but the greatest advantages were found for minority, inner-city students from low SES backgrounds (Word et al., 1990).

STAR has been credited with an unusually sound methodological design for the field of education research. Professor Emeritus of Mathematical Statistics at Harvard University, Frederick Mosteller (1995) said that STAR was "one of the most important educational investigations ever carried out and illustrates the kind and magnitude of research needed in the field of education to strengthen schools." (p.113)

The specifications set forth by the STAR research consortium established the following criteria: (1) including schools from different locations (inner-city, rural, urban, suburban) to compare the effects of class size by school type; (2) planning for schools to remain in the study for four years; (3) random assignment of teachers and students; (4) within-school design (at least one small class with a range of 13-17 and one regular and one regular-with-assistant class with each having a range of 22-25 students); and (5) all participating teachers were certified at the appropriate grade level. The final participants included 79 schools in 42 systems which resulted in over 6,000 students per grade level (Word et al., 1990).

Pate-Bain made provisions through the Tennessee Department of Education to determine any long-term academic achievement benefits of small classes. During grades 4 through 8, the Tennessee Department of Education provided researchers with standardized achievement test scores. Test scores were matched to the appropriate STAR cohorts and compared for significant differences. Results through grade 8 showed that those students who were in small classes during K-3 continued to score significantly higher on standardized achievement tests than their peers who had attended regular or regular/aide classes (Nye, Zaharias, Fulton, Achilles, & Hooper, 1991; Nye et al., 1992; Nye, Zaharias, Fulton, & Achilles, 1993; Nye et al., 1994; 1995). However, at grade 9 statistically significant results did not emerge (Nye, Cain, Achilles, Sotoohi, & Fulton, 1996). This was attributed to the statewide testing procedures that were in place for the ninth-graders (Nye et al., 1996).

Tennessee did not require ninth graders to complete the Tennessee Comprehensive Assessment Program (TCAP), which was the standardized achievement test that had been used to

compare STAR cohorts for grades 4 through 8.[1] The only test data available for comparison were Tennessee Competency Exam (TCE) scores used to certify high school exit skills. Since students had the option to test out of the TCE at grade 8, the sample available at grade 9 was artificially compressed. That is, the higher achieving students had already fulfilled the competency requirements without having to take the TCE, and were not included in the grade 9 analysis.

Since the State of Tennessee did not provide funding for a grade 10 1996-1997 STAR follow-up study, joint funding from the American Federation of Teachers (AFT) and the National Education Association (NEA) was awarded to HEROS to provide continuity to this research.

Purpose of this Study

Many studies have been conducted to determine if there are long-term benefits associated with early childhood interventions. The majority of these studies report significant benefits for children that last for a couple of years after program implementation, but results tend to fade over time. According to the literature, one predominant reason for the fade out is that once children enter school their age-specific needs are no longer addressed. As stated by Irvine, Flint, Hick, Horan, and Kukuk (1980), "If there is a concerted effort to build on the Pre K experience as the children progress through kindergarten and first grade, the positive effects of Pre K can be maintained." Another primary reason for fade out has been connected to the methodology of such studies. Most studies have not tracked children for a long enough time to detect if the fade out is offset in later years. However, the few studies that followed children until age 18 have shown that early childhood programs have a positive effect on high school graduation rates, but only 3 out of 5 of the studies found this effect to be statistically significant (Barnett, 1995).

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[1] The TCAP consists of both norm-referenced and criterion-referenced components. McGraw-Hill's nationally normed Comprehensive Tests of Basic Skills (CTBS) is used for the norm-referenced portion. The criterion-referenced test is a state-made test used to measure knowledge from mandated state curriculum.

There were two major purposes of this study. The primary purpose was to provide continuity to STAR by determining whether or not at the end of grade 10 STAR (K-3) small-class students maintained any academic achievement advantages over their peers who were in regular or regular/aide classes.

As the STAR students were followed, large numbers of students were lost from the database. Researchers hypothesized that besides students transferring to other schools, a significant portion of these students could have dropped out of school or been expelled by grade ten. Therefore, the second purpose was to conduct a pilot investigation of the effects of class-size on school dropouts within one of each of the four Project STAR school types (rural, urban, inner-city, suburban).

Tenth Grade Follow-up

Procedures

The State of Tennessee, Department of Education's Testing Division, provided HEROS, Inc. with the Tennessee Competency Examination (TCE) data. The grade 8 (1993-1994) TCE consisted of 45 math and 40 language items from the Tennessee Comprehensive Assessment Program (TCAP) criterion-referenced scales. The state compiled TCE results for each student and provided a pass/fail indicator. The grade 9 (1994-1995) and grade 10 (1995-1996) TCE were separate criterion-referenced tests and were independent from the TCAP tests that had been administered through grade 8. Rather than pass/fail indicators, actual scores were provided. Scores were based on the number of items answered correctly. Answering all items correctly would result in a perfect score of 100, and students were required to answer at least 70% of the items correctly to pass the test. In addition, State Testing provided data from those systems who

elected to administer the Tennessee Comprehensive Assessment Program (TCAP) at grade ten. This was the state mandated standardized achievement test that had been the data source used to follow the achievement of STAR students for grades 4 through 8. Beginning in the 1994-1995 school year the TCAP was optional, rather than required in grades 9 through 12.

Analyses

Grade 9 and 10 competency test scores were compared using a multivariate analysis of variance (MANOVA) to determine mean differences in math and language test scores by class type. Students who had attended small classes in at least the third grade were included in the analysis. Both ethnicity and gender were used as covariates in the analyses. While significant differences were apparent within the gender and ethnic analyses (Whites scored higher than minorities, and females scored higher than males.), there were no significant differences in either gender or ethnic composition of students by the three class types. Therefore, separate analyses of gender and ethnicity by class type were not conducted.

School type (inner-city, rural, urban, suburban) was not used as a covariate in these data analyses. As the STAR students progressed through school (middle schools, high schools) they entered a number of different school types that were different from their original STAR school. The school type variable was omitted from analyses beginning with the fifth-grade follow-up study (Nye et al, 1991).

A chi-square analysis was used to determine significant differences between class types on the pass or fail indicators supplied by the state for the grade 8 TCE. A chi-square was also used to analyze the tenth-grade competency scores so that results from the ninth grade TCE and the tenth grade TCE could be easily compared.

Findings

As a result of the TCAP becoming an option, very few STAR tenth graders (1995-1996) completed the test. Only a small number of STAR students (108) were found in this statewide data set. These students did not constitute a representative sample of STAR participants that would allow for reliable analyses because those students identified were located in only a few schools within four systems. For example, in Knox County, one of the larger inner-city systems in Tennessee, only 4 students from STAR small classes, 6 from regular-size classes, and 7 from regular-aide classes had taken the test. As was the case with ninth grade, investigators were left with only Tennessee Competency Examination (TCE) data for comparing academic achievement between class types.

A prior hypothesis posed that the small, regular, and regular/aide students had been made artificially similar as a result of the change in testing instruments from the TCAP to the TCE. It was speculated that due to a greater percent of the small-class students testing out of the TCE at grade 8, the grade 9 data did not provide a representative sample of small class students. To test this theory, historical TCE data from grades 8 and 9 were retrieved to compare with grade ten. Table 1 shows the available sample of STAR students located in the TCE data sets.

Table 1.
Number of STAR Students Located in the Tennessee Comprehensive Examination Data Sets

	Small	Regular	Regular/Aide	Total
Grade 8 (1993-94)	1,275	1,143	1,401	3,819
Grade 9 (1994-95)	1,203	1,261	1,466	3,930
Grade 10 (1995-96)	331	318	428	1,077
Total	2,809	2,722	3,295	8,826

As shown in Table 2, a significantly larger percent of STAR small-class students versus students who had attended regular and regular/aide classes did pass the TCE requirements at grade 8. These data would tend to support the earlier hypothesis that the students available for grade-9 analyses manufactured similarities between class type cohorts, which could account for the lack of significant differences at the end of grade 9.

Table 2.
Percent of STAR Students Passing the Tennessee Competency Examination at Grade 8 (1993-1994)

	Small (n=1,275)	Regular (n=1,143)	Regular/Aide (n=1,401)
Language	52.9%* (674)	49.1% (561)	48.0% (672)
Mathematics	36.4%* (464)	32.3% (369)	30.3% (425)

* Significant at $p \leq .05$

Actual TCE scores are not provided at grade 8 because the requirement to test out at that grade level is based on correctly answering a portion of items from the TCAP. State Testing provided a simple "pass/fail" variable for the eighth-grade TCE test-out status. The TCE scores from both grade 9 and grade 10 did not statistically favor one class type over another. Neither of the three class types from grades 9 or 10 averaged a passing score (70 or above). (See Tables 3 and 4).

Table 3.
Tennessee Competency Examination Scores for Project STAR Students at Grade 9 (1994-1995)

	Small (n=1,203)	Regular (n=1,261)	Regular/Aide (n=1,466)
Language Arts	65.1	64.3	63.6
Mathematics	62.5	62.9	61.8

However, with one exception, small-class students had higher mean competency scores than regular- or regular/aide-class students. At grade 9 regular-class students outscored small class students by .4 of point (62.9 vs. 62.5).

Table 4.
Tennessee Competency Examination Scores for Project STAR Students at Grade 10 (1995-1996)

	Small (n=331)	Regular (n=318)	Regular/AIDE (n=428)
Language	52.9 (n=331)	49.1 (n=318)	48.0 (n=428)
Mathematics	64.3 (n=230)	63.0 (n=234)	63.2 (n=322)

Another factor speculated to have artificially equated the academic achievement of the three class types was retention rates. That is, if more students from regular and regular-aide classes than from small classes had been retained prior to or at grade 9, then the TCE scores of regular and regular-aide students would be made up of those who had been at a higher academic level at the beginning of the ninth grade. This was theorized as another element that could have accounted for lack of significance in grade 9.

Data that were collected from Nashville-Davidson County Schools for the school drop out pilot study illustrate that this hypothesis could be substantiated. Researchers had access to three years of data from this system (1993-1994, 1994-1995, and 1995-1996 school years). When STAR students were not found with their appropriate grade level cohort (grade ten, 1995-1996), investigators searched all grades from these years and were able to identify students who were still in the system, but who were appearing at a lower grade level. These data did not delineate at which grade level(s) (K-9) a student was retained. Table 5 shows that more regular- and

regular/aide-class students than small-class students had been retained in grade levels prior to grade 10 (any grade level between K and 9). In the 1993-1994 school year, a significantly higher percentage (approximately 12 to 19%) of students in regular and regular/aide classes were in lower grades than their counterparts in small classes (about 8%). This difference grew with time. By the 1995-1996 school year, twice the percentage of students who attended regular or regular/aide classes (between approximately 30 and 44%) were found in lower grades than their STAR peers who attended small classes (about 17%).

Table 5.
Percent of Nashville-Davidson County STAR Students Retained in Various Grade Levels (K-9)

	Small	Regular	Regular/Aide
1993-94 School Year	7.5*% (n=107)	11.6% (n=69)	18.6% (n=102)
1994-95 School Year	8.2*% (n=110)	24.4% (n=82)	15.3% (n=118)
1995-96 School Year	16.7*% (n=96)	43.5% (n=69)	30.2% (n=96)

* Significant at $p \leq .05$

Researchers did have data to show students who were specifically retained at either grade 8, grade 9, or grade ten. Table 6 shows the number of Nashville-Davidson County STAR students who were retained during these particular grade levels. The 10.9 percent of small-class students retained at grade 8 was significantly less than the 27.4 percent of regular and 19.8 percent regular-aide students retained at those grade levels. At grade ten, although not statistically significant, the percent of small class retainees was also less than regular and regular-aide retainees.

Table 6
Percent of Nashville-Davidson County STAR Students Retained in Grades 8, 9, and 10

	Small	Regular	Regular/Aide
Grade 8	10.9*%	27.4%	19.8%
1993-94 School Year	(n=110)	(n=73)	(n=106)
Grade 9	22.6*%	37.7%	39.6%
1994-95 School Year	(n=110)	(n=73)	(n=106)
Grade 10	15.5%	19.7%	23.5%
1995-96 School Year	(n=97)	(n=96)	(n=78)

* Significant at $p \leq .05$

Although retention data were available only from Nashville-Davidson County Schools, these provide investigators with more evidence to validate the hypothesis formed at the end of grade 9 (i.e., the grade 9 sample, by virtue of testing procedures and retentions, did not constitute a reliable sample of STAR students). Coupling the retention data with the grade 8 TCE data shows how the ninth-grade sample was compressed to reflect higher achievers from the regular and regular/aide conditions and lower achievers from the small-class condition. However, an examination of retention using a broader sample of STAR students is needed before investigators can confidently accept this theory.

Nashville-Davidson County teachers are required to report letter grades numerically (A=100-93, B=92-85, C=84-77, D=76-70, F=70 and below). Table 7 shows average teacher calculated grades of students in the 1994-1995 school year for the subjects of English, mathematics, science, social studies, and foreign languages. This includes students from any grade, and is therefore more reliable in that the sample is not artificially made more similar by

Table 7
Mean Academic Grades of Nashville Davidson County STAR Students, 1994-95 School Year

	Small (n=99)	Regular (n=68)	Regular/Aide (n=94)
English	76.11*	63.57	63.93
Math	73.51*	62.56	61.97
Science	74.58*	64.00	63.12
Social Studies	63.77	60.21	52.61
Foreign Language	73.65	67.82	69.51

* Significant at $p \leq .05$

cutting out students who had failed the previous year. Notice that students who attended small classes consistently outscore students in regular and regular/aide classes. In English, math, and science, the students in the small classes outscored their counterparts by over 10 points. Even in the two subjects where the grades are not statistically significantly different, the students attending the small classes outscored their counterparts. Foreign language scores are more alike than scores from any other subject. However, not all students elect to take a foreign language, and thus the sample is made artificially similar. It is also interesting to note that the only group that has a passing mean score (a minimum of 70) in any subject is the small class group.

Pilot Study

Procedures

Using the K-3 database, identification numbers (social security numbers) of the STAR students from participating pilot schools were matched to the grade 8 (1993-1994 school year), 9 (1994-1995), and 10 (1995-1996) state testing data. A list of students from the participating pilot schools who were not appearing in the state data sets was generated. Each school system generated a list of students who were already coded in their data files as having withdrawn, been

retained, or dropped out of school from kindergarten (1985-1986 school year) through grade 10 (1995-1996 school year). Social security numbers of these students were then compared to those of the STAR students. After these two procedures, a list of any STAR students from the pilot systems who were still unaccounted for was generated. Investigators then visited the high school guidance counselors in each system who assisted them with accessing the cumulative records of students from the list. They began by reviewing records from the eleventh grade (1996-1997 school year) where students who remained on-target with their cohort would have been located. When student records were not located within the eleventh-grade files, the tenth-grade files (1996-1997) were searched, and if still not located the ninth-grade records were searched (1996-1997). When student records were located, all available data were retrieved.

Analyses

A MANOVA was used to determine mean differences in math, English, science, and social studies grades by class type. The students' grades in these subjects were analyzed separately. In addition, the students who attended school in Nashville-Davidson County Schools were analyzed separately from those attending Fentress and Pickett County Schools. Nashville-Davidson County Schools could only provide teacher grades for the ninth grade. For students in Fentress and Pickett, teacher grades were available for grades 9, 10, and the first semester of grade 11. These grades were all analyzed separately by school year. Students who had attended small classes in at least the third grade were included in the analysis. Both ethnicity and gender were used as covariates in these analyses. While significant differences were apparent within the gender and ethnic analyses, there were no significant differences in either gender or ethnic composition of students within the three class types.

Like the analyses of grade, analyses of days suspended and days absent were conducted using MANOVA . Both ethnicity and gender were used as covariates. The analyses of suspension days and days absent were conducted separately for grades 8, 9, and 10 for Nashville-Davidson County. These data were not available for Fentress and Pickett Counties.

A chi square analysis was used to determine if there were significant differences by class type in the percentage of students attending foreign language classes. Analyses were done separately for Nashville-Davidson County Schools, and Fentress and Pickett Counties. Nashville-Davidson County Schools could only provide foreign language classes for the ninth grade. For Fentress and Pickett, the data were available for grades 9 and 10, and for the first semester of grade 11. Due to the small number of cases, students who attended a foreign language class in any of these grade levels were merged for analyses.

Analyses of the mean number of advanced classes were conducted using a MANOVA. Both ethnicity and gender were used as covariates. These data were not available for Nashville-Davidson County Schools, but were provided by both Pickett and Fentress Counties. Like the analyses of foreign language classes, advanced classes taken in any grade were merged for analyses.

Findings

After locating a significant number of those students who were lost from the database, rather than finding that students had actually quit school, it was discovered that most of the students who were missing from the database had been retained. Only state testing data were made available in the STAR follow-up studies which meant that when students were retained a grade level they did not show up with their STAR counterparts who had been promoted to the

targeted grade level. Thus, the study also examined factors that might indicate future dropouts (e.g., retentions, suspensions), or indicate potential for post-secondary education (e.g., advanced course placement, enrollment in foreign language courses).

Investigators intended to study the effects of class size on school drop out rates for students who had attended one of the designated four STAR school types (rural, inner-city, urban, suburban). Three school systems, Nashville-Davidson County, Pickett County, and Fentress County had agreed to participate in this pilot. There were not enough missing students located within these systems to constitute sample sizes large enough for analysis by the four school types. Nashville-Davidson County Schools could be classified as inner-city because of cross-town busing which sent inner-city K-3 students out to suburban schools. One school was an inner city school with no busing. The other three had children bused to them from the inner-city housing projects. Therefore, Nashville-Davidson County students were merged as one group, and Pickett and Fentress students were merged as a group. This constituted a sample of inner-city students, and a sample of rural students.

As discussed earlier (shown in Tables 5 and 6), Nashville-Davidson County students (inner-city) who had attended small classes (K-3) were retained significantly ($p \leq .05$) less often from the time they entered school (K) through the end of grade 9 than those who had attended regular or regular classes with full-time teacher aides. Although, not statistically significant there were also fewer small-class students than regular- and regular/aide-class students retained at grade 10. Findings were similar for the rural students.

In addition, Nashville-Davidson County students who attended small classes (K-3) consistently made better grades than students in regular and regular/aide classes by the end of the

1994-1995 school year (see Table 7). In English, math, and science, the students in the small classes outscored their counterparts by over 10 points. Even in the two subjects (social studies and foreign language) where the grades were not statistically significantly different, the students attending the small classes outscored their counterparts.

Table 8 illustrates that between kindergarten and grade 8 a smaller number of rural students who had attended small classes (K-3) were held back a grade than their peers who had attended regular or regular/aide classes. Given the small sample size, it is not surprising that these differences were not statistically significant.

Table 8
Percent of STAR Pickett & Fentress Students Retained Between Kindergarten and Grade 8

Small	Regular	Regular/Aide
15.6% (n=32)	14.0% (n=50)	23.7% (n=38)

Students who are retained one or more grade levels are more likely to drop out of school (Alexander, Karl, L, Darling-Hammond, Linda, & Falk, Beverly, 1997; Frymier, Jack, 1990; Shepard, Lorie, A. & Smith, Mary Lee, 1990). The findings from this analysis indicate that attending small classes in the early grades may prevent failing later grades, thereby keeping students in school.

Since most accredited colleges and universities require entering freshman to have taken one or more foreign language courses at the high school level to be considered for enrollment, investigators conducted analyses on these data. As Tables 9 and 10 show there were significantly more small-class students enrolled in such courses than regular and regular/aide-class students. These data indicate that more small-class students than regular or regular-aide students in these

rural and inner-city samples will be prepared to apply to institutions of higher education. Approximately 26 percent more small-class students than regular or regular/aide-class students from rural areas were enrolled in foreign language courses. In the inner-city sample, 20 percent more students from the small-class group than the other two class types are enrolled in a foreign language course. This information is especially important because it provides investigators with the first look at the academic "track" of STAR students.

Table 9
Percent of Pickett & Fentress Co. STAR Students Taking Foreign Languages during High School

	Small	Regular	Regular/Aide
Grades 9, 10, 11 (1994-1996)	65.6%* (n=32)	40.0% (n=50)	39.5% (n=38)

* Significant at $p \leq .05$

Table 10
Percent Nashville-Davidson County STAR Students Taking a Foreign Language during Grade 9

	Small	Regular	Regular/Aide
Grade 9 (1994-1995)	52.7%* (n=110)	30.5% (n=82)	33.9% (n=118)

* Significant at $p \leq .05$

In addition to the number of students enrolled in foreign language courses, both Pickett and Fentress school systems were able to provide data showing the number of advanced academic courses their students had taken. These include higher-level elective courses such as algebra II, calculus, advanced placement English, etc. As shown in Table 11, by the first semester of eleventh grade STAR (K-3) students from small classes had taken significantly more advanced courses than students who attended regular or regular/aide classes.

Table 11
Mean Number of Advanced Academic Classes by Class Type in Pickett & Fentress Co.

	Small	Regular	Regular/Aide
Grades 9, 10, 11 (1994-1996)	3.2* (n=110)	1.9 (n=82)	2.0 (n=118)

* Significant at $p \leq .05$

Some of the data needed for analyses could be more readily provided by the rural systems than by the Nashville-Davidson County system, and vice versa. Data provided by Nashville-Davidson County Schools showed only 1 STAR student had dropped out of school. This student had attended a small class. The Nashville-Davidson County data did not show how many students had been expelled or sent to juvenile detention. For the rural schools, Fentress and Pickett Counties, these type of data were provided. As shown in Table 12, by the end of grade 10 very few students from either of the three class types had been expelled, sent to juvenile detention, or quit school.

Table 12
Number and Percent of STAR Pickett & Fentress Co. Students Who No Longer Attend School

	Small (n=110)	Regular (n=82)	Regular/Aide (n=118)
Dropped Out	0	3	4
Juvenile Detention	1	4	2
Expelled	1	0	1
Total Percentage	1.8%* (2)	8.5% (7)	5.9% (7)

* Significant at $p \leq .05$

None of these factors were statistically significant when analyzed individually. When analyzed as a whole, small class students experienced significantly fewer of these problems than students from the other two class types.

Although Pickett and Fentress Counties could not, Nashville-Davidson County Schools were able to provide data showing suspensions and number of days absent. As Table 13 shows, there were significant differences in the first two years. Students who attended small classes consistently had fewer suspension days. If suspensions are taken as a surrogate for discipline problems, the students who attended small classes had fewer discipline problems than those in the other two class types. Despite the fact that in the 1995-1996 school year there was no significant difference, it is important to note that the mean number of days small-class students were suspended was less than half the number of days that the students in the other two class types were suspended.

Table 13
Mean Number of Days Nashville-Davidson County STAR Students were Suspended

	Small	Regular	Regular/Aide
Grade 8 (1993-94)	.60* (n=110)	.61 (n=73)	2.25 (n=106)
Grade 9 (1994-95)	.49* (n=110)	1.28 (n=82)	1.33 (n=118)
Grade 10 (1995-96)	.32 (n=97)	.62 (n=76)	.77 (n=98)

* Significant at $p \leq .05$

As shown in Table 14, while there were no significant differences by class type for the number of days that Nashville-Davidson County students were absent, small class students consistently missed fewer days than students who were in the regular or regular/aide classes. Note that the number of days missed climbed for each group every year. However, even the

highest number of days absent for the students in the small classes was never as high as the lowest number of days absent for students from the other two groups.

Table 14
Mean Number of Days Nashville-Davidson County STAR Students were Absent

	Small	Regular	Regular/Aide
Grade 8 (1993-94)	12.67 (n=110)	18.77 (n=73)	16.04 (n=106)
Grade 9 (1994-95)	15.60 (n=110)	19.78 (n=82)	21.66 (n=118)
Grade 10 (1995-96)	15.88 (n=97)	22.55 (n=76)	24.00 (n=98)

Perhaps one of the most important outcomes of the pilot study was that researchers found methods that allowed them to locate students who had been missing from the STAR database. At the end of grade 4, all students from certain school systems were lost from the STAR follow-up studies. If investigators had continued to rely on cross-sectional state testing data alone, at the end of grade 10 only 2 Fentress County STAR students out of the original 79 would have been identified. Procedures used in the pilot study resulted in locating all 79 students. Similarly, only 10 Pickett County STAR students out of the original 81 would have been identified in the state testing database, but the pilot study recovered 78 out of the 81. Only 80 STAR students from Nashville-Davidson County Schools were located in the grade 10 state testing data, but the pilot study procedures recovered 387 out of the original 510.

Summary

Tenth graders who had participated in STAR small classes (K-3) appear to have maintained academic achievement advantages over their peers who attended regular or

regular/aide STAR classes. Although there were no statistically significant differences in the TCE grade-10 test scores by class type, it was found that a significantly larger portion of small-class students than regular- and regular/aide-class students had already passed the TCE requirement at grade 8.

Data from the pilot study showed that over the years, the students from small classes were less likely to fail a grade level, or be suspended than their peers who were in regular and regular/aide classes. Small-class students were found to be making better grades in their high school courses and to be taking more advanced courses than students from the other two cohorts. This enabled investigators to compare the academic paths taken by STAR small, regular, and regular-aide class students.

Researchers were able to identify methods for locating students who had dropped out of the STAR database, and discovered new outcome variables for measuring the academic achievement of STAR students. Between 76% and 100% of missing students were recovered from the five schools that were involved in the pilot study. Findings suggest that future research using the STAR database could address the effects of class size on a broader array of outcome variables than just cross-sectional test scores.

Future Research

The collaboration of the AFT and the NEA to fund this research provided continuity to the internationally recognized Project STAR study. The efforts of these two associations have served as a catalyst for producing further research using the STAR database. The Tennessee Legislature has contracted with HEROS, Inc. to conduct the eleventh-grade Project STAR follow-up study. HEROS, Inc. has also submitted proposals to private foundations seeking funds

to follow the activities of STAR students beyond high school. When funded, this research will answer additional questions concerning the longitudinal effects of class-size, and will significantly recover students who were lost from the STAR database.

For more information about Project STAR, contact Helen Pate-Bain, Chair or Jayne Boyd-Zaharias, Director, at HEROS, Inc., 213 Cumberland Drive, Lebanon, TN, 37087, telephone: (334) 540-7012 or (615) 449-7907, facsimile: (615) 444-3426, e-mail: heros@telalink.net.

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HEROS Mission

Health and Education Research Operative Services (HEROS), Incorporated is a 501 (c) (3) nonprofit organization. HEROS was established to serve other nonprofit organizations that need expertise in applying research and evaluation to education-related or health-related initiatives. Program evaluations and research projects are conducted to assess, and thereby improve, the implementation of services to children and families. Research or evaluation activities can include developing study designs, questionnaires, surveys, or data collection instruments, and performing data collection, data entry, database management, and statistical analyses, as well as report writing, writing for publication, and oral presentations.